CONCEPT PAPER

WORKSHOP TO DISCUSS POSSIBLE AMENDMENTS TO THE ZERO EMISSION VEHICLE (ZEV) PROGRAM

July 24, 2007

I. INTRODUCTION

At the May 2007 Board meeting, the Board instructed staff to examine possible changes to the regulation based on information provided by the Zero Emission Vehicle (ZEV) Independent Expert Panel (Panel) and from comments provided by the general public and effected stakeholders. ARB staff is currently evaluating possible changes to the ZEV program for consideration later this year based on a number of issues discussed at the May Board meeting. Staff has developed this concept paper as a starting point for further discussions with interested stakeholders regarding possible amendments. In developing amendments in light of the current trends, staff has identified several objectives for improving the regulation:

- Maintain the pure ZEV requirement in order to achieve our long term public health goals.
- Maintain requirements that accelerate ZEV technology development & deployment.
- Provide support for near-term ZEV demonstration projects.
- Take full advantage of technology options that are available today, to achieve air quality improvement and provide a bridge to ZEV commercialization.
- Provide manufacturers flexibility with respect to ZEV fuels, technologies, and compliance pathways.

II. MAJOR TOPICS FOR DISCUSSION

Staff will discuss possible “course corrections” in response to the information provided by the Expert Panel and presenters at both the ZEV Technology Symposium and the May 2007 Board meeting and staff findings resulting from several years of implementation. The sections below provide some initial detail on each of the options under consideration and then pose some questions regarding the possible effect of these options on various aspects of the ZEV Program.

A. Alternative Path - Phase II, III and IV Volume Requirements

The Alternative Path (Alt Path) was established in the 2003 amendments to the regulation to encourage continuous production of ZEVs. Auto manufacturers taking the Alt Path are required to produce their market share of a target number of vehicles during each implementation phase (described in the table below). In taking the Alt Path, auto manufacturers could also make up their remaining pure ZEV obligations with Advanced Technology Partial ZEVs (AT PZEVs). The Board committed to conducting a technology review to assess the appropriateness of phases II through IV.

Table I Existing Alt Path Requirement:

Phase	I	II	III	IV
Years	2005-2008	2009-2011	2012-2014	2015-2017
Total*	250	2,500	25,000	50,000

* Each manufacturer is required to produce their sales-weighted share of this total number

Table II, below, describes staff's suggested amendments to the Alt Path as presented at the May 25th Board Hearing based on the findings of the Expert Panel, and several options also presented by various stakeholder groups.

Table II Possible Options:

Phase		I	II	III	IV
Years		2005-2008	2009-2011	2012-2014	2015-2017
***Option 1**	Staff Proposal	250	2,500	2,500	25,000
***Option 2**	Combined Phase	250	5,000		10k to 15k
***Option 3**	No Change	250	2,500	25,000	50,000

* Each manufacturer is required to produce their sales-weighted share of this total number

<u>Discussion:</u>

The goal is to adjust the Alt Path phase of the regulation to consider the appropriate number of next generation vehicles for ZEV demonstrations while continuing to strengthen the program by deploying additional advanced technology vehicles in order to further advance ZEV component technology and manufacturing capacity.

- Concerns have been raised by the Expert Panel regarding fuel-cell stack life, high-volume cost, and the ability to move from research and development to pre-commercialization demonstrations within the next 3 to 6 years.
- While progress has been steady, advances in fuel cell technology are needed to meet high-volume cost objectives.
- An alternative vehicle architecture, the plug-in fuel cell vehicle, has the potential to meet durability and cost objectives with near-term technologies.
- Option 2, suggested by some auto manufacturers, provides flexibility around product plans, provides more time for technology advancement before introducing larger numbers of vehicles, but also runs the risk of creating a gap in vehicle production if auto manufacturers back-load their obligation. In

addition to this proposal, auto manufacturers have requested that small volume demonstrations (on the order of hundreds of vehicles across all manufacturers) be continued rather than ramping up to thousands in the next phase.
- Option 3, suggested by several environmental organizations, suggests that since staff does not propose changing the required number of ZEVs in Phase II, a decision on Phase III could be postponed. However, auto manufacturers have indicated that product planning and development schedules for the 2012-2014 model years is in place now and a feasible regulation is needed now for this timeframe.

Questions regarding options:
- Are the proposed numbers feasible and do they provide appropriate pressure to improve pure ZEV technology development?
- Should auto manufacturers "backfill," that is, provide additional numbers of other advanced technology vehicles should the Board decide to reduce the number of ZEVs in Phase II and/or Phase III?
- What other "backfill" actions would be acceptable and supportive of ZEV program success?
- How may this possible modification impact technology suppliers and infrastructure deployment?

B. Type IV ZEV definition

The ZEV regulation's definitions of ZEV types differentiate ZEVs based on their driving range and whether or not they can refuel quickly. (Parameters listed in Table III, below) As ZEVs demonstrate greater range or fast refueling capability, they earn more credit towards compliance. In order to further foster advanced technology iterations, auto manufacturers must reduce the cost and improve the durability performance of these vehicles under the alternative path. A way of recognizing that vehicles have improved performance characteristics may be to add a Type IV category that provides an incentive to further technology advancement under the alternative path provision.

Table III Existing and Proposed Vehicle Types in the Alternative Path:

Type	Minimum Range	10 min. fast-refill
I	50 miles	No
II	100 miles	No
III	100 miles	Yes
IV	200 miles	Yes

Discussion:
A Type IV ZEV could be used to demonstrate technology progress in key areas the auto manufacturers and the U.S. Department of Energy's Technology Validation Program have identified as necessary for widespread commercialization, including range, durability and performance. Creation of a Type IV ZEV could be used to allow auto manufacturers to show technology

progress while producing fewer overall vehicles through an exchange ratio in the Alt Path. For example, an auto manufacturer could be allowed to produce their market share of the target volume with Type III ZEVs, or some lower number of Type IV ZEVs based on the exchange (Type III to Type IV) ratio. Additionally, establishment of an appropriate ZEV credit level for Type IV ZEVs would have to be established.

There are stakeholders who argue that establishment of a higher range ZEV type is not warranted; that if ZEVs are to be made commercially viable, the auto manufacturers will figure out and build to the needed vehicle range and other parameters. The argument continues that continually rewarding higher range and other metrics of 'consumer acceptance' is not the job of the ZEV regulation, but better placed with the auto manufacturer.

<u>Questions</u>:

- Does this help to further advance technologies under the alternative path?
- What measurement metrics make sense (e.g., extended range, warranties on the fuel-stack or battery pack)?
- Should the fast-refueling requirement for Type III be eliminated?
- If a fast-refueling metric is needed, how can this requirement be integrated better in the regulation?
- How would Type IV ZEVs be used in the Alt Path in relation to Type IIIs (exchange ratio)?
- What credits per vehicle would a Type IV ZEV earn?

C. Use of Battery Electric Vehicles (BEV) in the Alternative Path

In today's regulation, BEVs (Type I – City type BEVs and Type II – full function BEVs traditionally) are limited in how they can be used to comply within the Alt Path. Table IV, below, lays out the caps and ratios for use of BEVs within the Alt Path. Staff is proposing to remove the restriction for Type II ZEVs and propose new ratios for use of BEVs in the Alt Path so that if an auto manufacturer chose to produce BEVs, they would be encouraged to market them in California and use them for compliance. Table V describes staff's proposed amendments to the cap on use of BEVs and lists ranges of exchange ratios for use of BEVs as substitution for Type III (fuel cell) ZEVs.

Table IV Existing Cap and Ratio on Type I & II Vehicles

Type	Cap (percent)	Ratio to Type III (2005-2011)	Ratio to Type III (2012-2017)
I	50	20:1	10:1
II	50	10:1	5:1

Table V Proposed Option

Type	Cap (percent)	Ratio (vs. Type III) (2009-2017)
I	50	3:1 to 5:1
II	0	1:1 to 3:1

Discussion:

- The ratio attempts to reflect the difference in desirability between Type I & II vehicles and Type III vehicles.
- Cost and utility may still be a barrier to full commercialization of Type I and Type II BEVs, but they should be allowed to play a more active role in the Alternative Path, providing greater auto manufacturer flexibility.
- Suggestion of the removal of barriers to use of BEVs in the Alt Path has spurred discussion with several manufacturers about the possibility of marketing BEVs in California again.
- Discussion of this proposed amendment has also concerned some stakeholders who fear that divergence from development of fuel cell vehicles will slow progress towards commercialization of ZEVs.

Questions regarding options:

- Does removing the cap for Type II vehicles significantly impact the development of fuel cell vehicles? (Positively or negatively?)
- What metrics should be used to establish the ratio between ZEV Types in the Alt Path (Cost, utility, etc)?
- Are the proposed ratios of Type I and II vehicles compared to Type III vehicles sufficient to continue to promote development of BEVs?
- Are the proposed ratios of Type I and II vehicles compared to Type III vehicles sufficient to continue to promote development of fuel cell vehicles?

D. ZEV Credit Levels

As shown in Table VI, the credit earned by different ZEV types falls dramatically in 2009. This reflects the staff's assumptions that early multipliers would no longer be needed after the initial phase of implementation of the regulation and that the time would be right to steer the program toward a more simple "one vehicle one credit" model. Credits are still not at 1 to 1 in the coming phases because we continue to differentiate ZEV Types, but the translation from percentage requirement to vehicle requirement gets closer to the intent of the regulation. Some stakeholders have requested that credit levels not drop so abruptly in 2009. They argue that technology has not advanced sufficiently to warrant less credit. Increased credit per ZEV effectively allows large manufacturers to produce fewer AT PZEVs if they are taking the Alt Path. If they are taking the Base Path, they must produce more ZEVs or use banked ZEV credits at a faster rate.

Table VI Existing ZEV Credit:

Type	2008	2009-2011	2012-2014
I	7	2	2
II	10	3	3
III	40	4	3

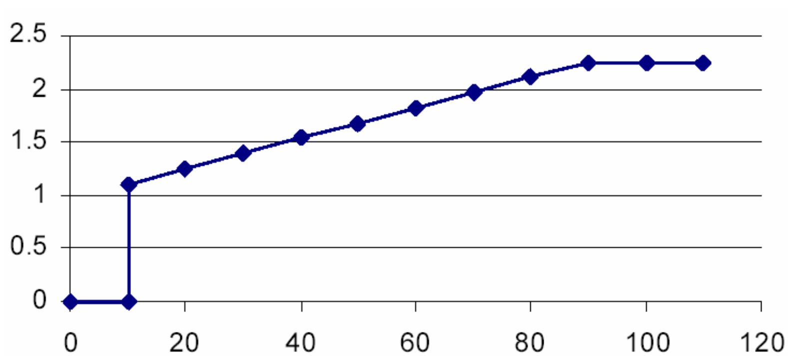
<u>Questions regarding credit options:</u>

- Should the credits per vehicle be increased?
- How would raising the credits per vehicle be offset throughout the program given that the Board did not want the amendments to result in fewer vehicles?
- What justification can be provided for raising the credits?

E. Plug-in Hybrid Electric Vehicles (PHEVs):

The Expert Review Panel found that PHEVs foster mass market ZEVs and their commercialization should be encouraged. Blended PHEVs may also provide substantial benefit and further help in advancing ZEV enabling technologies and battery development. The Board asked staff to look closely at providing additional incentives to foster PHEV development – both blended and all electric range (AER) models. Staff may also need to consider extending the timeframe for the PHEV credit multiplier. In the current regulation PHEV credit is awarded based on all electric range as shown in Figure I.

Figure I Existing All Electric Range Credit:



Proposed Options:

- Based on stakeholder concerns over battery readiness and all-electric range (AER), consider reducing the minimum AER threshold from 10 miles to 5 miles.
- Given the status of battery technology, auto manufacturers have expressed concern that the battery warranty requirement for hybrids may be a deterrent to commercializing plug in hybrids. Therefore, staff may consider a battery warranty provision adjustment
- As an alternative to AER credit, reward “blended” PHEVs with credit for “usable battery energy”.
- Extend early introduction multipliers through Phase III

Questions regarding Options:

- How should “blended” PHEV credits be calculated; should they be based upon battery capacity; total or usable?
- What is the time frame for bringing PHEVs to market?
- How do we modify the current AT PZEV battery warranty to address changes to the PHEV battery requirement (5 year vs. 10 year)?
- Should we create a new category (Silver +) to further encourage Plug-in Hybrid Electric Vehicle development?
- If we do create a new category, should this category be used to “backfill” gold on a temporary basis?
- Should high-scoring AT PZEVs (PHEVs and H2ICEs) be allowed to earn more credit than a pure ZEV for a set period of time?

F. AT PZEV Credit Calculations:

Manufacturers’ are concerned about the increased quantity of AT PZEVs in Phase II and III. AT PZEVs are considered a success under the current regulation for providing technology advancement for ZEV development, and therefore, AT PZEVs credits should reflect their value to the program. Table VII lists the current credit levels for AT PZEVs. Table VIII lists example credit levels requested by auto manufacturers.

Table VII Existing AT PZEV HEV Credit:

Type	A	B	C	D	E
2003-08	0	0.2	0.2	0.4	0.5
2009-11	--	--	0.2	0.4	0.5
2012-14	--	--	--	0.35	0.45
2015+	--	--	--	0.25	0.35

Table VIII Proposed Option:

Type	A	B	C	D	E
2003-08	0	0.2	0.2	0.4	0.5
2009-11	--	0.2	0.2	0.4	0.5
2012-14	--	--	--	0.4	0.5
2015+	--	--	--	0.35	0.45

<u>Questions regarding proposal:</u>

- Should credit values be extended?
- How would raising the credits per vehicle be offset throughout the program given that the Board did not want the amendments to result in fewer vehicles?
- What justification can be provided for raising the credits?

G. Calculation of NEV Credits

In 2003 the ZEV regulation established a schedule to decrease the amount of credit earned by neighborhood electric vehicles (NEVs) to a low of 0.15. Later in 2003, staff reported to the Board on the appropriateness of such a dramatic drop in the credit levels and suggested in that report that it was not warranted. We suggested that a revision to the credit level be examined the next time the regulation was up for review.

<u>Proposed amendment:</u>

- Increase NEV credit to 0.3 credits

<u>Discussion:</u>

- According to some stakeholders, NEVs provide air quality and other benefits that justify more credit than they currently earn.
- The Expert Panel reported that NEVs consume less energy and therefore emit fewer upstream emissions than most full function BEVs.
- The Expert Panel reports that NEVs are affordable, commercially viable, and can serve to condition and educate the public on the attributes of BEVs, and possibly stimulate interest in PHEVs.
- Some manufacturers consider NEVs to be potentially significant for ZEV market development, for example, to successful City EVs, as more sophisticated vehicles are demanded by customers.
- According to usage studies on existing NEVs, if credit were based on ZEV mileage accumulation, NEV credit would be higher than proposed (approximately 1.0).
- While staff supports increasing credit value to reflect these substantial benefits we want to be cautious of automakers potential “gaming” of the regulation. Because they are a mature, commercially viable option, staff suggests that we continue to omit NEVs from other longer-term ZEV incentives, for example, eligibility for early introduction multipliers,sold vs leased” multiplier, etc.

Questions regarding proposal:

- Should there be limits on NEV credit use such as caps? If so, how many should be allowed, and how would these be justified?

H. Intermediate Volume Definition & Transition to Large Volume:

Existing Definition:

Vehicle manufacturers' are considered "large volume manufacturers" when their California sales exceed 60,000 vehicles for three years in succession. Subsequent to becoming "large," Intermediate volume manufacturers have six years to comply with the regulation.

Discussion:

Intermediate volume manufacturers can currently meet their entire ZEV obligation through the production of PZEVs. Compliance with the Alt Path for these manufacturers would not increase the total number of Type III vehicles because all large manufacturers split the target number of ZEVs in the Alt Path based on their market share.

Proposed amendments:

- Staff proposes to retain the definition, but to reduce the burden on manufacturers transitioning from intermediate to large.
- Require a pro-rated volume of pure ZEVs if manufactures are required to produce midway through a compliance period.

Questions regarding proposals:

- Does addition of new auto manufacturers to the large auto manufacturer category benefit the development of ZEVs?
- Are their additional ways in which the transition to large could be softened?

I. Section 177 Travel Provision

In 2003, the manufacturers expressed concern about the multiplicative effects of California's ZEV regulations across the country as other states adopted and implemented the State's ZEV regulations. These states, referred to as Section 177 states, would cause the ZEV requirement to effectively double.

The "Travel Provision," based on the notion that early demonstrations are best accomplished with small numbers of vehicles, was to allow fuel cell vehicles placed in California (or in other Section 177 states) to count towards compliance in all states. The Travel Provision sunsets in 2012.

Proposed Option:

- Extend the travel provision to 2015.
- Include Type II ZEVs in the travel provision, which would allow Type II ZEVs (full function BEVs) placed in California to count towards compliance in other Section 177 states (and vice versa).

Discussion:

- All manufacturers believe that the travel provision should be extended to reflect the current demonstration technology availability.

Questions regarding options:

- Should volumes of pure ZEVs be produced in significant volumes to assist with infrastructure in other ZEV states?
- Comments on the provision extending to Type II ZEVs?
- Will other ZEV states support this extension?

J. Other Possible Modifications

- Should additional credits be provided to vehicle manufacturers' that produce vehicles with tailpipe emissions substantially lower than SULEV standard?
- Should staff make an adjustment to the alternative path calculation by requiring a percentage versus a fixed number of pure ZEVs?
- Should we advance the timeframe for merging the Base and Alternative paths?

III. Wrap Up and Next Steps

Staff looks forward to a constructive dialog about these proposed changes to the regulation. We will be presenting the amendments at the workshop in a Powerpoint format for each major topic area with a break between topics to discuss the questions posed and receive comments provided by workshop participants. It is our hope to encourage a back and forth discussion around the topics described and to keep the conversation focused on the areas of the program directed by the Board for change. We also encourage interested parties to provide comments on these topics in writing and through individual meetings.

Next Steps:

Workshop	July 24, 2007
Initial Statement of Reasons due to Office of Administrative Law	October 9, 2007
Board Hearing (Sacramento)	December 6 and 7, 2007